

## **Synthesis of MS Characterization of Peptide-Based Polymers as Synthetic Immunogens**

*K. Downard, M. Chance and H. Rashidzadeh (Albert Einstein College of Medicine)*

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The inability of current vaccines to offer complete protection and the increasing number of infectious disease for which no vaccine exists has prompted the development of new immunogens. Synthetic peptides based on the determinants of protein antigens can be used as immunogens and offer improvements over traditional preparations. However, peptides alone are usually weak immunogens and the delivery of multiple copies of determinants conjugated to a protein carrier suffers from the complication that the carrier can conceal or even eliminate the anti-peptide response.

**Methods and Instrumentation:** N-terminally acryloylated peptides are combined through a radical-based polymerization chain reaction into a synthetic co-peptide polymer. The relative concentrations of peptide and polymerization agents and the reaction time and temperature enables the dispersity and length of the polymers to be controlled. The co-polymers were analyzed by on-line ESI-MS to determine both polymer dispersity and composition. In the case of highly complex polymer mixtures, molecular weight cut-off filters were used prior to MS analysis.

**Preliminary Data:** A new form of synthetic immunogen is described in which multiple copies of peptide determinants are assembled in a predictable and controlled manner onto an immunologically-inert polymer chain. We have developed chemistries in which free peptides are derivatized at their N-terminus, and polymerized through radical chain propagation reactions. We have used high pressure liquid chromatography and electrospray ionization mass spectrometry to characterize both the structure and dispersity of the polymers produced, where the number of peptides in each chain is estimated. Results will be presented which illustrates the peptide modification procedure and the assembly of the polymers for both model peptides and peptide determinants to a hemagglutinin antigen of the influenza virus. Separate studies have shown that these peptide co-polymers are effective immunogens and result in the production of higher antibody titers than the peptides alone.

**Novel Aspect:** Synthesis and characterization of novel peptide co-polymers by ESI mass spectrometry.